

**Subactivity: Operations and Research**  
**Line Item: Local Warnings and Forecasts**

**GOAL STATEMENT:**

See the Overview for the National Weather Service Operations, Research, and Facilities for a discussion of our goals.

**BASE DESCRIPTION:**

NOAA provides around-the-clock weather and flood warning and forecast services to the general public to protect life and property, and to meet the forecasting needs of all segments of the economy. Weather services are provided primarily by a national network of 122 Weather Forecast Offices (WFOs) and 13 River Forecast Centers (RFCs), assisted by 13 Data Collection Offices (DCOs). The provision of services by the National Weather Service (NWS), described in the following pages, depends on the coordination, management, and centrally-funded support provided by NWS' national and regional headquarters. This infrastructure includes such diverse functions as the maintaining and coordinating of the NOAA Weather Radio Network, the logistics of spare parts for all NWS observing systems, testing and evaluation of new observing sensors and systems, and coordinating and funding centralized employee training. Management and support for the NWS is provided by a national headquarters, four regional headquarters offices within the continental United States, plus regional offices for Alaska and the Pacific region, the National Data Buoy Center in Bay St. Louis, MS, and the National Logistics Support Center and National Training Centers, both located in Kansas City, MO.

*Weather warnings and forecasts:* NWS forecasters issue local warnings of severe weather such as tornadoes, severe thunderstorms, flash floods, and extreme winter weather at 122 WFOs nationwide. WFOs prepare forecasts for zones, which are comprised of counties or portions of counties that experience similar weather. Each WFO has forecast responsibility for multiple zones. WFOs also provide the main field forecast support for the marine and aviation programs as well as guidance for the fire weather program supporting federal lands management and wildfire control.

Each county in the United States is assigned to a specific WFO for warning purposes. The WFO issues and distributes local warnings of severe weather for its assigned counties. WFOs are the recognized weather, water, and climate experts for their local areas and issue severe weather and flash flood warnings. In preparing local warnings and forecasts, WFOs use forecast guidance prepared by the National Centers for Environmental Protection (NCEP).

Beginning in FY 2004, NOAA entered the digital forecast arena. This significant step takes NOAA from a product-centered organization to a true environmental information agency. The initial digital capability includes a national digital forecast database that aggregates digital forecasts of maximum and minimum temperatures, sky cover, probability of precipitation, wind speed and direction, and significant wave height across the conterminous United States. The database allows private sector weather providers and weather-sensitive businesses to take the data and create products and services useful to themselves and their customers.

In FY 2005 the following forecast elements became operational in the database: maximum temperature, minimum temperature, and probability of precipitation (12 hour), temperature, dew point, and weather forecast. In FY 2006, the database will be expanded to include observations.

NWS' Office of Science & Technology (OST) develops techniques for predicting mesoscale phenomena (e.g., heavy precipitation, tornadoes, and severe thunderstorms). These techniques are being developed and improved to use digital data from observing systems, such as NEXRAD (Next Generation Weather Radar), and the latest geostationary satellites. OST develops models to improve hurricane tracking, hurricane probability estimates, and analyses; and storm surge models to assist in developing hurricane evacuation plans for coastal basins. Through these activities, OST works to best exploit and improve the capability of weather data observing and processing systems to meet hydrologic, meteorological, and service requirements.

*Aviation weather services:* NWS provides a broad range of services in support of the aviation community. WFOs prepare site-specific airport terminal forecasts four times per day with amendments as needed for 575 public use airports in the 50 states and U.S. territories around the globe. These offices also produce approximately 300 individual route-oriented forecasts three times per day. WFOs also take observations to meet local aviation requirements. The NWS is currently undertaking a long-term, ten-year initiative to improve its aviation weather services, which began in FY 2003. Since then, the NWS began issuing new turbulence, icing and convective (thunderstorm) forecast products to support commercial and general aviation; acquired aircraft-based water vapor sensors and partnered with airlines to install the sensors and provide the data; developed and fielded new low ceiling and visibility forecast training for NWS meteorologists; and partnered with industry to produce training seminars for pilots. In two years results have been impressive, exceeding expectations. For example, the False Alarm Rate for low ceiling and visibility forecasts at airports has improved 13% over the FY 2004 GPRA goal.

During FY 2005 through FY 2007, the NWS expects to see continued improvement of aviation forecasts through the implementation of an improved observational sensing strategy, higher resolution forecast models, and improved guidance tools integrated into the standard NWS forecast production system. Key to this effort is working with the FAA's Weather Research and Development program to transition and sustain 5 new forecast products required by aviation users. NWS will improve the Advanced Weather Interactive Processing System (AWIPS) and the Aviation Forecast Preparatory System to enable our meteorologists to focus on the site-specific airport terminal forecasts. NWS will transition a new automated National Convective Weather Forecast product, indicating the onset of thunderstorms out to two hours, as well as new automated products for icing, turbulence and low ceiling and visibility. In FY 2007, NWS will improve its aviation weather forecast services through increasing the number and quality of aviation weather observations from aircraft by procuring and installing 75 additional water vapor sensors. In addition, the NWS will deliver the initial Graphical Aviation Forecast for all aviation users and develop and implement new training programs on convection for forecasters, pilots, and controllers.

*Marine and Coastal weather services:* Management of the Nation's marine, coastal and tropical weather services is led by the Marine and Coastal Weather Services Branch within the Office of Climate, Water, and Weather Services. Products and services such as forecasts, analyses, watches, warnings and advisories of maritime conditions as well as coastal and tropical hazards are provided by forty seven WFOs and three components of the NCEP. Products are issued for the coastal waters, offshore, high seas waters, and Great Lakes nearshore and open lake waters.

Using observational data sources such as buoy observations and satellite imagery, numerical model forecast guidance provided by various sources such as the NCEP and the Great Lakes Environmental Research Laboratory (GLERL), and analyses of ice from the National Ice Center (NIC), the forecasters at tropical and marine centers and coastal and Great Lakes offices maintain a continuous monitoring of weather conditions over marine zones. Routine forecast products and analyses, watches, warnings and advisories are disseminated in alphanumeric, gridded, and graphical formats to describe maritime conditions and tropical and coastal hazards. Marine and coastal products describe wind, waves, visibility, icing, coastal flooding, severe weather, high surf, and rip currents. Tropical products describe hazards associated with tropical cyclones such as storm surge, winds, waves, cyclone intensity, and inland impacts.

Efforts in FY 2007 will be focused on enhanced forecaster training, increased customer outreach, and implementation of new products. One area of focus will be to educate emergency managers and all users on the strengths, limitations, and application of new tropical cyclone probabilistic wind speed products. Enhanced customer outreach and training will be provided for coastal hazards such as rip currents and high surf. The number of gridded products provided for marine and tropical conditions over the marine zones will be expanded.

*Fire weather services:* In FY 2007, the NWS will develop advanced forecasting techniques that will enable land management agencies to better determine where fire danger risks exist, and will serve as input to fire behavior models. The NWS will develop ensemble forecasting techniques to produce probabilistic one-to-seven-day forecasts for fire managers so that they can optimally position assets, develop gridded fire weather element forecasts that can be used as input into more accurate fire danger assessments, implement a software application to produce site-specific fire weather planning forecasts for the day 3-7 timeframe, and improve software for Incident Meteorologists to use on site.

*Tsunami warnings:* Tsunami watches and warnings for all U.S. communities at risk are prepared and issued by the Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC) at Ewa Beach, Hawaii, and the West Coast/Alaska Tsunami Warning Center (WC/ATWC) at Palmer, Alaska. NWS collects and analyzes observational data from an international network of seismological observatories and sea level observing stations that operate on a cooperative basis. The centers use these data to prepare watches and warnings covering all U.S. territories and states bordering on the Pacific and Atlantic Ocean Basins and disseminate them to WFOs, Federal and state disaster agencies, military organizations, private broadcast media, and other facilities that can furnish warning information to the public.

In FY 2004, NWS assumed operational responsibility for the National Tsunami Hazard Mitigation Program (NTHMP). The goal of the NTHMP is to ensure adequate advance warning of tsunamis along all U.S. coastal areas and appropriate community emergency response to a tsunami event. In FY 2005 and FY 2006, in response to the destructive Indian Ocean Tsunami, the U.S. Tsunami Warning Program including the NTHMP was upgraded and expanded (\$17.2M in FY 2005 and \$9.5M in FY 2006) to enhance the monitoring, detection, warning and communications designed to protect lives and property for all U.S. communities at risk. This two-year, \$26.7M investment expanded the existing six Pacific Ocean DART buoy array to a 32 DART buoy array and added a 7-DART Buoy array for the Caribbean/Atlantic Ocean.

This new investment also expanded NOAA's National Water Level Observing Network (NWLON) adding 16 new NWLON stations and upgrading 33 existing NWLON sites. Additionally, the PTWC and the WC/ATWC were upgraded to 24/7 operations; and NOAA accelerated required tsunami inundation mapping and modeling for all at-risk U.S. coastal areas and accelerated community-based tsunami hazard mitigation programs and community-based tsunami education and outreach programs (TsunamiReady).

*River & flood forecasts and guidance:* NWS provides river-flow and flood-forecast services using prediction models and databases. Hydrologists and hydrometeorologists develop this forecast information at 13 River Forecast Centers (RFCs); this information is the basis for flash-flood and flood-warning programs implemented at WFOs. These services support emergency management and water resources activities. NWS is improving these services by implementing the Advanced Hydrologic Prediction Service (AHPS). AHPS applies new science, providing more accurate forecasts for river conditions ranging from droughts to floods. AHPS provides more information in a timely and user-friendly manner, which can be posted on the web. AHPS extends existing one- to three-day river forecasts to 14-day and longer outlooks, provides greater information than prior systems and maximizes NOAA resources to deliver more accurate and comprehensive predictions of river height and flood potential. By the end of FY 2006 AHPS will be deployed at 1,684 forecast points in the Midwest, Northeast, Middle Atlantic, Southeast, South, West and Alaska. In FY 2007, the NWS plans, within current funding levels, to continue nationwide implementation of AHPS, with deployment at an additional 309 forecast points in these areas. The FY 2007 budget also supports extramural partnerships to carry out operationally-oriented hydrologic research, deployment of new flash-flood forecasting tools, and introduction of more effective river forecasting models.

*Water resource forecasts:* This activity establishes NOAA's capability to provide water resource managers with localized water and soil condition forecasts via a national digital database incorporating assimilation of all available hydrometeorological data and observations; and a Community Hydrologic Prediction System (CHPS) necessary to advance water prediction science. This will allow NOAA's research and development enterprise and operational service delivery infrastructure to be integrated and leveraged with other federal water agency activities and the private sector to form the backbone of a national water information system. Through this, NOAA will produce a new suite of high-resolution forecasts (including estimates of uncertainty) for streamflow, soil moisture, soil temperature, and many other variables directly related to watershed conditions, via collaboration and sharing of data and algorithms with the university and private sector research groups. Furthermore, these activities enable NOAA to deliver a national database of drought analyses and predictions, and generate user friendly Geographic Information Systems (GIS) products for monitoring drought. This activity contributes to the National Integrated Drought Information System (NIDIS).

The Office of Climate, Weather, & Water Services (OCWWS) provides several centralized guidance and operational support functions to the RFCs. In addition, OCWWS provides hotline support to field users, and provides a focal point for assembling and disseminating real-time hydrologic information.

The Office of Hydrologic Development (OHD) manages the application of hydrological forecasting techniques and provides hydrologic model development for field operations. OHD also develops improved hydrologic and hydrometeorological models and procedures in support of national flood and water resources forecasting programs including: specialized flood and flash flood forecasting procedures using linked hydrological, meteorological, and climatological models/products; improvements to the Ensemble Streamflow Prediction model and its complementary models in the NWS River

Forecast System; algorithms to combine NEXRAD precipitation estimates with data from satellites and other ground based observation systems; development of remotely-sensed (airborne and satellite) snow-water equivalent and snow cover data products in near real-time; and integration of hydrologic conditions and forecasts.

*Forecast coordination:* At each WFO, a Warning and Coordination Meteorologist (WCM) is responsible for the coordination of local forecast and warning information with local emergency management and other state and local officials, both leading up to and during severe weather events. This ensures the most effective dissemination of NWS forecasts and warnings, and adequate public response to weather warnings. The WCMs serve as NOAA's service representatives and work with local partners to ensure they know how best to use NOAA services, and to assess requirements for improved services.

*Dissemination/communication:* In order to disseminate data, forecasts, watches, and warnings, NWS relies on the following systems: NOAA Weather Wire Service, NOAA Weather Radio network, central radar data collection and distribution, Emergency Management Weather Information Network, NOAA/Geostationary Operational Environmental Satellite (GOES) communications, and Family of Services. The AWIPS Local Data Access and Dissemination (LDAD) capability allows two-way information exchange between WFOs and local users, including emergency management, leading up to and during severe weather events.

*Space Weather:* The Space Environment Center (SEC) in Boulder, CO, provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances. SEC provides services to a broad user community of government agencies, industries, public institutions, and private individuals involved in satellite operation, space exploration, radio navigation, high-altitude polar flights, high-frequency communications, remote intelligence gathering, long-line power and data transmissions, and geophysical exploration. SEC serves many government, industry and private-sector clients, and such end-product users as the power industry the airline industry, satellite operators, and the National Aeronautics and Space Administration (NASA). SEC's research scientists study the sun's electromagnetic, particle, and plasma emissions and the processes by which they affect the near-Earth space environment. SEC takes a leading role in advocating and specifying new space-environment sensors for operational use. The SEC, with the U.S. Air Force, jointly operates the national civilian space weather operations center. Forecasts, alerts, and warnings are provided to customers on a 24 hour-per-day, seven day a week basis. SEC products are synthesized from over 1,400 data streams providing observations of the solar terrestrial environment, including x-ray flux, charged particles, and magnetic field changes on the sun, in interplanetary space, and at Earth.

*U. S. Weather Research Program (USWRP):* The goal of the USWRP is to accelerate improvement in NOAA's forecasting capability for high-impact and routinely disruptive weather through improved forecasts of timing, location, and specific rainfall amounts associated with hurricane landfall and flood events that significantly affect the lives and property of U.S. population. NOAA's investment in the USWRP continues the cooperative effort among NWS, OAR and NESDIS within NOAA, four other USWRP agencies (The National Science Foundation (NSF), NASA, the U.S. Navy and the U.S. Air Force), and the university community.

The USWRP supports research and development grants and activities focused on improving weather data analysis, numerical weather prediction models and other forecasting techniques, provides field observational support, and strives for information science and technology transfer to operations and services within the USWRP agencies, in order to reach performance goals defined for the following high priority areas:

**Hurricanes at Landfall:** USWRP focuses on predicting hurricane track five days in advance, improving forecasts of where a hurricane will make landfall, improving forecasts of hurricane intensity at landfall, improving surface wind forecasts, and providing more precise quantitative rainfall forecasts where it could lead to inland flooding.

**Optimal Mix of Observations/Quantitative Precipitation Forecasts (QPF):** This effort seeks to use data from advanced observing systems to improve weather prediction.

**The Observing System Research and Predictability Experiment (THORPEX) - A World Weather Research Program:** NOAA's goal in this program is to double the rate of improvement in 3 to 14 day high impact weather forecasts seen over the past 20 years. This will significantly expand NOAA's operational weather and water prediction capabilities. For the first time, NOAA will be ready to issue operational daily weather forecasts for the second week, and detailed precipitation forecasts for days 3 to 7. The expanded product suite will greatly increase the socio-economic benefits to the nation from weather and water forecasts.

These goals will be achieved through coordinated research in the following areas:

- **Observing system:** Design and testing of new atmospheric, ocean, and land surface observing systems in the framework of the Global Earth Observing System of Systems (GEOSS) for global weather forecasting
- **Data Assimilation:** Development and testing of new methods for the more efficient use of new and existing observations
- **Numerical modeling and predictability:** Design and testing of new Numerical Weather Prediction techniques, including multi-center ensemble systems
- **Socio-economic applications:** Design and testing of new weather and water forecast products, and new user application procedures.

In this ambitious global program NOAA partners with NASA, the U.S. Navy and the NSF, as well as a large number of countries from five continents, including Canada, China, France, Germany, India, Japan, Korea, the United Kingdom, the Russian Federation, and Australia, and other major global programs like the International Polar Year (IPY). In addition to improved 3 to 14 day weather and water forecasts over the U.S., the enhanced global forecast capabilities will be used to further NOAA's goal of environmental safety across the globe. Advance weather and water forecasts will be distributed, and their use promoted to developing nations for the prevention and mitigation of environmental disasters in an effort coordinated by the World Meteorological Organization.

**NOAA Profiler Network (NPN):** The NPN was established as a demonstration network in 1992 containing 35 stations within the Central U.S., Alaska, and New York. The NPN provides high quality wind profiles at 72 vertical levels through 53,000 feet above ground level and low level temperature profiles every 6 minutes.

Wind measurements from the demonstration NPN have improved the skill and accuracy of NOAA's weather forecasts and warnings in network areas. The current NPN radars use an experimental transmitter frequency of 404 mega hertz (MHz) issued by the National Telecommunications and Information Administration (NTIA). NTIA has since given the 404 MHz frequency to search and rescue satellites (SARSAT) and granted the NPN permanent use of 449 MHz. To be used operationally, 30 wind profiler transmitters (currently operating at 404 MHz) need to be converted to 449 MHz by the end of the FY 2008 when a new series of European Space Agency SARSATS are launched.

In FY 2004, Congress directed NOAA to perform a Cost and Operational Effectiveness Analysis (COEA) for the NPN. The COEA clearly demonstrated the NPN's benefits to several important NWS missions: severe weather warnings (for tornadoes, flash floods, and winter storms), watches, and short-term forecasts. Based on these findings, NOAA has initiated actions to transition the NPN to operational status in FY 2005 and integrate it into its upper air observing system. In FY 2007, NOAA will continue to operate and maintain the current network of wind profilers and is converting the profilers to a different frequency to prevent interference with new search and rescue satellites.

*Air Quality Forecasts:* In FY 2004, NOAA began operational production of air quality forecast guidance with the implementation of NOAA's Air Quality Forecast capability over the northeastern U.S. This capability is an integrated, end-to-end forecast system that provides timely, reliable forecast guidance to accurately predict the onset, severity and duration of poor air quality. Forecast guidance consists of next-day ground-level ozone predictions, at hourly intervals and 12km grid resolution. Forecast products are available via the NWS Telecommunications Gateway, and NOAA's partner agency, the Environmental Protection Agency (EPA). EPA is working with state and local public and private air quality agencies that issue air quality warnings and forecasts, providing health-based interpretations. These products meet customer requirements from federal, state and local, and public sectors with state-of-the-science information to assist state and local air quality forecasters who issue health-based air quality alerts for designated cities, and provides information for people at risk from poor air quality.

Phased development and testing activities are in progress to extend the initial ozone-based, regional capability. By FY 2006 it will cover the entire eastern U.S., by FY 2007 the guidance will cover the continental U.S. (CONUS), and by FY 2009 it will cover the nation. Development and testing of additional components needed for particulate matter (PM) forecasts is also in progress, aimed at extending the operational capability to include in an initial PM forecast capability by FY 2011. Real-time air chemistry observations will be incorporated into forecast models as needed for extended forecasting improvements.

*The Climate Services Division* at NWS headquarters provides the strategic vision for climate services at NWS and oversees the NWS climate services program. It develops policy and requirements for climate prediction products and other services related to the period of week two out to one year, including seasonal forecasts and threat assessments. The division also sets NWS field policies and procedures for climate prediction products, defines service and mission needs, solicits user feedback to evaluate new products and services, and approves final product design. The Climate Services program maintains strong ties with other countries; across NOAA lines, specifically through the NOAA Climate Office; with federal agencies; the university community; and the private sector, and encourages collaborative arrangements among the Regional Climate Centers, NOAA Regional Integrated Science and Assessments (RISAs), State Climatologists, NWS WFOs, and Regional headquarters to tailor climate forecasts for local users.

Base activities support the objective, “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the Department of Commerce Strategic Goal of “Observe, protect, and manage the Earth's resources to promote environmental needs.”

**PROPOSED LEGISLATION:**

None.



**SUMMARIZED FINANCIAL DATA**

(Dollars in thousands)

Subactivity: Operations and Research	FY 2005 ACTUALS	FY 2006 CURRENTLY AVAILABLE	FY 2007 BASE PROGRAM	FY 2007 ESTIMATE	INCREASE / DECREASE
Line Item: Local Warnings and Forecasts					
Local Warnings and Forecasts Base (C)	9,938	12,849	1,068	1,068	-
Local Warnings and Forecasts Base (CT)	9,212	9,089	12,734	12,734	-
Local Warnings and Forecasts Base (WW)	503,798	504,532	547,220	548,620	1,400
Tsunami Hazard Mitigation	4,239	2,260	-	-	-
Tsunami Warning & Environmental Obs for AK (TWEAK)	1,971	1,972	-	-	-
Strengthen US Tsunami Warning Network	7,063	6,016	8,055	20,415	12,360
Air Quality Forecasting Pilot Program	2,925	-	-	-	-
Air Quality Forecasting	1,725	2,959	2,945	5,445	2,500
Alaska Data Buoys	1,478	-	1,683	1,683	-
HI Data Buoys	247	-	-	-	-
Sustain Cooperative Observer Network	1,774	986	981	1,871	890
Hurricane Mitigation Alliance (SUSF)	3,203	2,071	-	-	-
Susquehanna River Basin Flood System	-	1,972	-	-	-
Red River Basin Institute/Decision Info Network	267	-	-	-	-
New England Weather Technology Initiative	542	-	-	-	-
NOAA Profiler Network	3,155	2,860	2,836	6,336	3,500
NC Flood Plain Mapping Pilot	584	-	-	-	-
Pacific Island Compact	3,450	3,452	3,465	3,515	50
Space Environment Center (C)	197	-	-	-	-
Space Environment Center (WW)	6,653	3,945	4,148	7,347	3,199
US Weather Research Program	4,436	4,931	4,999	7,456	2,457
Vermont Northeast Weather With Data Integration	247	217	-	-	-
Payment to OMAO	468	-	-	-	-
Coastal & Inland Hurricane Monitoring & Prediction Program	-	1,480	-	-	-
Coastal Weather Monitoring for Catastrophic Events	-	468	-	-	-

Subactivity: Operations and Research	FY 2005 ACTUALS	FY 2006 CURRENTLY AVAILABLE	FY 2007 BASE PROGRAM	FY 2007 ESTIMATE	INCREASE / DECREASE
Western Kentucky Environmental Monitoring Network	-	1,479	-	-	-
National Data Buoy Center	-	22,920	-	-	-
Shenandoah Air Quality Forecasting	-	1,726	-	-	-
TAU & PIRATA Arrays	-	2,959	-	-	-
Sea Level Monitoring & Tide Gauge Network	-	237	-	-	-
Subtotal: Local Warnings and Forecasts	567,572	591,380	590,134	616,490	26,356
Advanced Hydrological Prediction Services	5,717	4,931	4,939	6,037	1,098
Aviation Weather	2,366	3,452	3,453	4,653	1,200
Subtotal: Aviation Weather	2,366	3,452	3,453	4,653	1,200
WFO Maintenance	-	8,277	7,316	7,316	-
Weather Radio Transmitters Base	2,287	2,289	2,297	2,297	-
NOAA Weather Radio Transmitters - HI	197	-	-	-	-
NOAA Weather Radio Transmitters - MS	-	197	-	-	-
NOAA Weather Radio Transmitters - AI	-	50	-	-	-
Subtotal: Weather Radio Transmitters	2,484	2,536	2,297	2,297	-
<b>TOTAL</b>	<b>578,139</b>	<b>610,576</b>	<b>608,139</b>	<b>636,793</b>	<b>28,654</b>
<b>FTE</b>	<b>4,146</b>	<b>4,116</b>	<b>4,116</b>	<b>4,125</b>	<b>9</b>

Note: The dollars in this table represent budget authority.

## PROGRAM CHANGES FOR FY 2007:

**Florida/Caribbean Hurricane Data Buoy (Operation and Maintenance) (+0 FTE and +\$1,400,000):** NOAA requests 0 FTE and \$1,400,000 to operate and maintain the seven new weather data buoys funded/deployed under the FY 2005 Hurricane Supplemental Appropriation. These buoys support enhanced real time hurricane data observations and storm monitoring in the Caribbean, Gulf of Mexico, and the Atlantic Ocean to support the NOAA hurricane warning and forecast mission. The FY- 2005 Hurricane Supplemental provided one-time funding to procure and deploy these buoys. This program adjustment requests the funding required to support the long-term operation and maintenance of these platforms. This investment is one of the high priority investments required for NOAA's implementation of the Integrated Ocean Observing System (IOOS) as the coastal and open ocean component of the Global Earth Observing System of Systems (GEOSS).

Combined with other like-identified IOOS investments across NOAA, it is part of NOAA's strategy to provide initial benefits of an integrated ocean observing system, focusing on enhancing key observational capabilities throughout NOAA, and our ability to provide customers with enhanced coastal data and information.

### **Statement of Need**

The seven newly installed data buoys require annual maintenance and shore-side operating/infrastructure support to maintain reliable data output. These seven data buoys consist of one 3-meter, two 6-meter, two 10-meter, and two 12-meter buoys.

### **FY 2007 Proposed actions**

- Provide field service and maintenance (\$0.93M) includes: integration and servicing (\$0.13M); and ship support for servicing (\$0.79M)
- Provide shore-side operation/infrastructure support (\$0.29M) includes: data processing and operations (\$0.16M) and industrial infrastructure (\$0.12 M)
- Provide and maintain spare equipment/buoy to support field maintenance strategy (\$0.16M)

These seven hurricane data buoys require increased ship-time for scheduled service since they are quite a distance away, require a much different ship with greater lift capability (especially for the 10- and 12-meter buoys) for the less frequent buoy exchanges, and must be repaired as soon as possible, requiring a dedicated service trip, if any should fail during the hurricane season.

### **Benefits**

3. Real time data from these strategically sited data buoy stations will assist the NOAA Tropical Prediction Center (TPC) to more accurately determine cyclone formation and dissipation; the extent of tropical cyclone wind circulation; the location and center of cyclones; direction, height, and distribution of ocean waves generated by cyclones; the maximum cyclone intensity; and the quality of measurements and estimates obtained from remote-sensing reconnaissance aircraft and satellites.
4. Proper maintenance and continued operation of the supplemental buoy network, the resulting data, and its contribution to the forecast and warning process are key components helping NOAA meet its national and international analysis and forecast responsibilities aiding the public and government in making preparation and evacuation decisions regarding tropical cyclones.

### **Performance Goals & Measurement Data**

This increase will support the objective: "Advance understanding and predict changes in the Earth's environment to meet America's economic, social, and environmental needs" under the DOC Strategic Goal of 'Observe, protect, and manage the Earth's resources to promote environmental needs'. Specifically, this increase supports NOAA's Weather and Water strategic goal and the performance measure below.

O&M funding for the buoys will continue the real time data stream. The buoys will produce over 45K observations per year. Without the maintenance funding the data stream will not continue.

Performance Goal: <i>Weather and Water</i>	FY04 Baseline	FY05	FY06	FY07	FY08	FY09	FY10	FY11
Number of Observations/year <i>with</i> Adjustment	0	12K	45K	45K	45K	45K	45K	45K
Number of Observations/year <i>without</i> Adjustment	0	12K	45K	0	0	0	0	0

5. The new buoys are expected to allow the TPC to determine more accurately tropical cyclone formation and dissipation, extent of wind field (radii of 34, 50 and 64 knot winds), center location, maximum intensity and ocean wave characteristics. Such improvements to analyses should translate into more accurate short-term forecasts of these quantities in TPC products. To establish metrics for the buoys, TPC will review its Tropical Cyclone Discussion, Tropical Weather Outlook, and other products (as necessary) to document the frequency and magnitude (where known) of changes to TPC analyses and/or forecasts of the above meteorological and oceanographic measures.
  - Because tropical cyclones are relatively rare events at any location, TPC anticipates that a period of two or three years of storms and storm observations will be necessary to generate information about the contribution of the buoys.

**Strengthening the U.S. Tsunami Warning Program (+4 FTE and +\$12,360,000):** NOAA requests an increase of 4 FTE (5 Positions) and \$12,360,000 to sustain the Administration's commitment to strengthen the U.S. Tsunami Warning Program. Funds are required to maintain and operate the expanded tsunami warning system put in place in FY 2005 and FY 2006. Lessons learned from the 2004 Indian Ocean Tsunami indicate that there are three key interlocking components of an effective Tsunami Warning/Response System: (1) Tsunami Hazard Assessment (must include comprehensive coastal US risk assessments/inundation mapping); (2) Tsunami Warning Guidance (must include 24/7 tsunami detection and warning systems and the dissemination of accurate and timely tsunami forecasts and warnings (seconds literally count)); and (3) Tsunami Mitigation (including community-based emergency response plans, public education/awareness (TsunamiReady communities and inundation/evacuation mapping)). This investment is one of the high priority investments required for NOAA's implementation of the Integrated Ocean Observing System (IOOS) as the coastal and open ocean component of the Global Earth Observing System of Systems (GEOSS). Combined with other like-identified IOOS investments across NOAA, it is part of NOAA's strategy to provide initial benefits of an integrated ocean observing system, focusing on enhancing key observational capabilities throughout NOAA, and our ability to provide customers with enhanced coastal data and information.

## Statement of Need

In response to the 2004 Indian Ocean Tsunami, the Administration proposed expanding the U.S. Tsunami Warning Program to protect U.S. lives and property along all coasts (Pacific, Gulf of Mexico, Atlantic and the Caribbean). Requested funds are required to operate and maintain the newly expanded DART systems, new sea-level monitoring stations, and the upgraded local seismic networks supporting the West Coast /Alaska Tsunami Warning Center (WC/ATWC) and the Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC) and to operate both the WC/ATWC and PTWC as 24/7 Operation Centers. Funds are also requested to accelerate the NOAA plan to provide effective, community-based tsunami hazard mitigation actions including required inundation flood mapping, modeling and forecasting efforts (MMFE) and evacuation mapping, and community-based public education/awareness/preparedness for all U.S. communities at risk. The requested funds will accelerate this MMFE and complete this project within 7 years, versus the currently planned 10-year MMFE schedule. Funds are also required to accelerate NOAA's tsunami research activities, focusing on the development of the fundamental scientific and technical products and detection systems essential to improve Tsunami Forecast coverage and data needed for rapid and reliable Tsunami Warnings.

## Proposed Actions:

*In FY 2005, the tsunami warning system expansion plan called for:*

- Awarding procurement contracts for first 10 DART buoys (PAC)
- Procuring and install/upgrade new sea level monitoring/tide gauge stations in the Pacific and Alaska Regions and the Caribbean (ORF)
- Begin staffing increases to provide 24/7 warning coverage at the Pacific and Alaska Tsunami Centers (ORF)
- Expanding the International Tsunami Information Center (ITIC) (ORF)
- Begin upgrading NWS-owned seismometers in Alaska and Pacific Regions to improve Local Tsunami Warning capabilities (PAC)
- Improving existing seismic detection network in the Caribbean (PAC)
- Begin expansion of the PTWC Facility for 24/7 Operations (Construction)
- Accelerating and expanding tsunami education/outreach (Tsunami Ready program) to improve community preparedness (ORF)
- Accelerating Tsunami Inundation Mapping along the West Coast and expanding this program into the Caribbean/Atlantic/Gulf of Mexico (ORF)

*In FY 2006, the tsunami warning system expansion plan calls for:*

- Installing 16 new DART Buoys in the Pacific and Caribbean (ORF)
- Procuring 40 DART buoys including 10 spares and 3 redundant buoys for Alaska to insure continuity of operations in harsh seas off Alaska (PAC)
- Operating and maintaining 49 new/upgraded sea level monitoring/tide gauge stations (ORF)
- Completing the expansion of the PTWC facility to accommodate 24/7 Operations (PAC)
- Completing upgrade of NWS-owned seismometers used to improve tsunami detection (PAC)
- Providing 24/7 warning coverage at the Pacific and Alaska Tsunami Centers (ORF)
- Expanding Tsunami Ready program to improve community preparedness (ORF)

- Continuing Tsunami Inundation Mapping along the West Coast and for the Caribbean./Atlantic/Gulf of Mexico (ORF)
- Expanding Tsunami Mitigation Activities through the NWS/ITIC (ORF)

***In FY 2007, the total funding of \$20.415M will be used for:***

24. Deploying the remaining 13 DART systems in the Pacific Ocean Basin (\$3.34M)
25. Operating and maintaining the expanded DART Buoy System (26 DARTs deployed in FY2006) (\$7.46M)
  2. NDBC O&M Costs: \$4.15M
  3. NMAO Ship time Servicing Cost: \$3.31M
26. Providing for emergency repair of DARTs (additional ship time costs) (\$0.91M)
27. Operating and maintaining the expanded “tsunami-reporting” sea-level monitoring network (\$0.78M)
28. Accelerating tsunami inundation mapping, modeling, and forecast efforts (MMFE) for all U.S. communities at risk (5-year effort vs. current 7-year effort) (\$2.07M)
29. Continuing accelerated tsunami education/outreach activities including the TsunamiReady program to improve community preparedness for all U.S. communities at risk (\$0.23M)
30. Adding 2.25 FTEs (3 Positions) to manage the Tsunami Program's expanded/accelerated tsunami inundation mapping, modeling and forecast efforts for all US communities at risk and accelerate the development of the fundamental scientific and technical products and detection systems essential to improve Tsunami Forecast coverage and data needed for rapid and reliable Tsunami Warnings (\$0.304M)
31. Adding 1.5 FTEs (2 Positions) to supplement NDBC DART Program Management. One FTE will oversee/direct the expanded/accelerated DART deployment programs and the other FTE will manage NDBC contract (engineering) staff in DART buoy design and assembly. (\$0.20M)
32. Continuing NOAA’s DART R&D program to improve DART reliability, cost-effectiveness and capabilities (\$0.48M)
33. Upgrading the existing PRSN to provide local and regional tsunami warning capabilities for the Caribbean (\$0.34M)
34. Complete the expansion and modernization of the local seismic networks for the WC/ATWC and the PTWC (\$0.27M)
35. Fully funds 24/7 Operations at the PTWC and WC/ATWC (\$1.52M)
36. Fully funds ITIC Hazard Mitigation Program Expansion (\$0.22M)
37. Continues funding for the National Tsunami Hazard Mitigation Program (\$2.291M)

### Performance Goal and Measurement Data

This increase will support the objective: “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the DOC Strategic Goal of ‘Observe, protect, and manage the Earth’s resources to promote environmental needs’. Specifically, this increase supports NOAA’s Weather and Water strategic goal and the performance measures below.

Performance Measure	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11
<b>Tsunami False Alarm Rate</b>								
Local	75%	75%	75%	75%	75%	75%	75%	75%
Distant	75%	75%	75%	50%	40%	25%	25%	25%
<i>with</i> Adjustment								
<b>Tsunami False Alarm Rate</b>								
Local	75%	75%	75%	75%	75%	75%	75%	75%
Distant	75%	75%	75%	75%	75%	75%	75%	75%
<i>without</i> Adjustment								
<b>Tsunami Warning Lead Time * (minutes)</b>								
Local Tsunamis	15	10	8	6	5	5	5	5
Distant Tsunamis	30	30	30	20	15	15	15	15
<i>with</i> Adjustment								
<b>Tsunami Warning Lead Time * (minutes)</b>								
Local Tsunamis	15	10	8	8	8	8	8	8
Distant Tsunamis	30	30	30	30	30	30	30	30
<i>without</i> Adjustment								

\*Tsunami Warning Lead Time measures the amount of time between when a seismic event occurs and when the tsunami warning is issued.

**Air Quality Forecasting (+0FTE and \$2,500,000):** NOAA requests 0 FTE and \$2,500,000 to expand ozone and PM forecast capability. The Air Quality Forecasting program provides air quality forecast guidance with the implementation of NOAA’s Air Quality Forecast capability. This increase will allow for nationwide deployment of ozone forecasts in FY 2009, and for initial PM forecast capability in FY 2012. The air quality forecast capability for next-day ground-level ozone, first deployed operationally in September 2004 over the Northeastern U.S., and now covering Eastern US, will be extended through phased development and testing nationwide in FY 2009.

**Sustain Cooperative Observer Program (+0 FTE and \$890,000):** NOAA requests 0 FTE and \$890,000 for the O&M support for NOAA legacy Cooperative Observer program. This program provides observational meteorological data in near real-time to support forecast, warning and other public service programs of the NWS. More than 11,000 volunteers take observations on farms, in urban and suburban areas, national parks, seashores, and mountaintops and the data that are collected are truly representative of where people live, work and play.

**NOAA Profiler Network (+5 FTE and +\$3,500,000):** NOAA requests an increase of \$3,500,000 and 5 FTE (7 Positions), to transfer the Wind Profilers from research to operations. The Wind Profilers, vertical looking radars, installed in 1988, are used for a variety of analytical forecasting tasks. Wind profile data are used as input for numerical (computer) weather models that predict clouds, precipitation, and temperature. The data also provide important indicators of where severe weather such as tornadoes and winter storms may form, requiring weather advisories, watches, or warnings. Weather forecasters also use wind profiler data for issuing aviation Significant Meteorological (SIGMET) advisories and wildfire predictions.

The National Profiler Network (NPN) radars are using an experimental transmitter frequency of 404 megahertz (MHz) issued by the National Telecommunications and Information Administration (NTIA). NTIA has given the 404 MHz frequency to search and rescue satellites (SARSAT) and granted the NPN permanent use of 449 MHz. Thirty 404 MHz wind profilers need to become operational, which requires the transmitters to be converted to 449 MHz by the end of the FY 2008 when the new SARSATS are launched.

### **Statement of Need**

The NPN must be upgraded to operate at a different frequency because of interference with signals from new search and rescue (SAR) satellites. Currently, the SAR beacons and the NPN operate at the same (404 MHz) frequency. Consequently, the NPN wind profiling radars interfere with the SAR and whenever a satellite is overhead, the NPN is turned off to prevent any interference. This only occurs about 90 minutes per day. However, the European Space Agency will begin launching a constellation of satellites called *Galileo* in FY 2006. These satellites will have a SAR capability. These SARSATS will be in the sky for hours instead of minutes. Under these conditions, NPN profilers will have to shut down more than 23:30 hours per day rendering the network useless. The solution is to change the operating frequency to the non-interfering 449 MHz, a primary shared frequency for wind profilers and DOD testing.

The Senate Appropriations Committee requested as part of a Cost and Operational Effective Analysis (COEA), "...to determine the cost to upgrade the NOAA Profiler Network (NPN) over the next decade versus the short, medium, and long-term costs of ending the NPN program". The results of the COEA demonstrate that high-frequency wind data benefit several important NWS missions: severe weather warnings (for tornadoes, flash floods, and winter storms), watches, and short-term forecasts. These products are important for public safety, aviation, and wildfire support.



The NPN wind profile information improves NWS operational warning and watch performance capability. Performance statistics indicate that tornado, winter storm, severe storm, and flash flood forecasts and warnings, and aviation weather and fire weather warnings for NWS Weather Forecast Offices (WFOs) with wind profilers are more accurate and are able to provide longer warning lead-times. The wind profiler data, received every 6 minutes, helps forecasters more quickly detect environmental changes critical to the formation of tornadoes and other severe weather. Comparison of the statistical elements such as probability of detection, false alarm rate, Critical Success Index, and lead time at WFOs within the NPN, demonstrates that these WFOs, on average performed better than those outside the network and the national average. These statistics were evaluated in the paper “*The Need for Real-Time, High-Frequency, Observational Wind Profile Data Nationwide for Improved Forecast and Warning Operations*” by Peter L. Wolf, dated 2004

### **Proposed actions**

NWS will execute a comprehensive operations and maintenance program with 5 FTE (7 Positions) Government personnel performing acquisition management and COTR responsibilities in completing the commercial acquisition of profiler replacement and upgrades, providing policy and program oversight, conducting 24/7 monitoring and control functions, and accomplishing maintenance operations. The frequency conversion effort will start in FY 2007 with the award of contracts for engineering development. Upgrades to the new 449 MHz transmitters will begin in FY 2009 (22 sites) and will complete in FY 2010 (15 sites). The engineering effort will include the design required to replace the transmitters, receivers, antennas, amplifiers and other obsolete system equipment for 37 wind profilers

Wind profiler performance requirements are being coordinated with the National Ocean Service (NOS) and others in support of the Integrated Ocean Observation System (IOOS). As part of the frequency conversion and technology refresh, wind profilers are also being engineered to meet requirements for coastal wind information.

### **FY 2007 Total \$6.336M**

Acquisition cost – \$3.27M

- Initiate engineering design and development contract for new frequency compliant transmitters
- Develop Profiler shut down procedures and coordinate with data users the development of contingency plans for the loss of Profiler data as SARSAT interference issues arise

38. Recurring Operations and Maintenance costs - \$3.066M

- Provide operations and maintenance support for current Profiler network

### **Performance Goals & Measurement Data**

This increase will support the objective: “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the DOC Strategic Goal of ‘Observe, protect, and manage the Earth’s resources to promote environmental needs.’ Specifically, this increase supports NOAA’s Weather and Water strategic goal and the performance measures below.

(NOTE: The table below reflects performance measures for those WFOs within the National Wind Profiler Network)

Performance Goal: <i>Weather and Water</i>	FY04 Baseline	FY05	FY06	FY07	FY08	FY09	FY10	FY11
GPRA Performance Measure Tornado Warning Probability of detection <i>with</i> adjustment *	.79	.79	.79	.79	.79	.79	.79	.79
GPRA Performance Measure Tornado Warning Probability of detection <i>without</i> adjustment *	.79	.79	.79	.79	.62	.62	.62	.62
GPRA Performance Measure Tornado Warning False Alarm Ratio <i>with</i> adjustment *	.68	.68	.68	.68	.68	.68	.68	.68
GPRA Performance Measure Tornado Warning False Alarm Ratio <i>without</i> adjustment *	.68	.68	.68	.68	.85	.85	.85	.85
GPRA Performance Measure Tornado Warning Lead Time (min.) <i>with</i> adjustment *	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
GPRA Performance Measure Tornado Warning Lead Time (min.) <i>without</i> adjustment *	12.9	12.9	12.9	12.9	9.5	9.5	9.5	9.5
Wind Profiler Product Availability <i>with</i> Adjustment	80 %	80 %	80 %	80 %	85 %	90 %	95 %	95 %
Wind Profiler Product Availability <i>without</i> Adjustment	80 %	80 %	80 %	80 %	0 %	0 %	0 %	0 %

\*Accuracy Performance Measures for Weather Forecast Offices, 1999 through 2003 (Wolf 2004). GPRA measure targets reflect Wind Profiler impact only; does not reflect other improvements that impact the national GPRA targets.

**Pacific Island Compact (+0 FTE and \$50,000):** NOAA requests 0 FTE and \$50,000 to support the five Micronesian Weather Forecast Offices served by the Compact of Free Association.

**Space Environment Center (SEC) (+0 FTE and \$3,199,000):** NOAA requests 0 FTE and \$3,199,000 to continue operations at the SEC. SEC provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances. SEC provides services to a broad user community of government agencies, industries, public institutions, and private individuals involved in satellite operation, space exploration, radio navigation, high-altitude polar flights, high-frequency communications, remote intelligence gathering, long-line power and data transmissions, and geophysical exploration.

**US Weather Research Program (USWRP) (+0 FTE and \$2,457,000):** NOAA requests 0 FTE and \$2,457,000 for accelerating air quality research for particulate matter forecasts and to expand THORPEX.

**Advanced Hydrological Prediction Services (AHPS) (+0 FTE and \$1,098,000):** NOAA requests 0 FTE and \$1,098,000 for nationwide implementation of AHPS. In FY 2007, the NWS plans, within current funding levels, to continue nationwide implementation of AHPS, with deployment at an additional 309 forecast points in these areas. The FY 2007 budget also supports extramural partnerships to carry out operationally-oriented hydrologic research, deployment of new flash-flood forecasting tools, and introduction of more effective river forecasting models.

**Aviation Weather (+0 FTE and +\$1,200,000):** NOAA requests 0 FTE and an increase of \$1,200,000 to expand this multi-year effort to improve aviation weather services. This requested increase will enable procurement and fielding of 75 additional water vapor sensors as part of an Integrated Upper Air Observing system, and transition additional products to a digital environment.

### **Statement of Need**

Today, weather accounts for 70% of all air traffic delays within the U.S. National Airspace System (NAS), resulting in a \$10B impact to the U.S. economy, \$4B of which the Federal Aviation Administration (FAA) has determined is preventable. The FAA has stated a requirement to the NWS for aviation forecasts to have an 80% probability of detection (POD) and a 20% false alarm rate (FAR). To that end, the Aviation Weather program continues to implement projects and training opportunities that improve both the accuracy of weather information and the way in which weather information is utilized. In addition, the Aviation Program is supporting the Joint Planning and Development Office (JPDO) effort to develop the Next Generation Air Transportation Systems (NGATS), with the Department of Commerce (DOC) being lead agent for a 5-agency (Department of Defense (DOD), Department of Transportation (DOT), Department of Homeland Security (DHS), National Aeronautics and Space Administration (NASA), and DOC) Weather Integrated Process Team. The most significant deficiencies in the aviation program include: lack of forecast elements critical to aviation (turbulence, icing, convection, low ceiling and visibility) in a digital format; observation gaps, (in particular, water vapor observations) with a temporal and spatial scale to drive improvements in macro/micro-scale forecast operations to support improvements in aviation meteorology; needed training for NWS meteorologists to incorporate new technology; and new procedures in the forecast process. Pilots, controllers and flight planners require products in digital formats to facilitate and expand their use in the cockpit and to convey forecast specifics graphically leading to better, more informed decision making.

### **Proposed Actions**

This funding will provide additional means for NWS to improve its aviation weather forecast services through three major efforts:

- 1) Procure additional water vapor sensor data
- 2) Transition and sustain FAA/NASA funded aviation weather R&D
- 3) Enhance capability and utilization of NWS weather products and services

## **FY 2007 Deliverables (shown here in terms of total program funding)**

### **New Observations (Data) (\$2.2M)**

*Expand acquisition of Aircraft-based Water Vapor Data* – Procure, install and operate 125 aircraft based water vapor data systems. Costs include procurement and installation of field change kits. In this also provides for communications of data. This capability will provide Numerical Weather Prediction Models and forecasters with approximately 750 additional vertical moisture soundings and 45,000 discrete observations per day.

### **New & Improved Forecast Products (\$2.2M)**

- *New Aviation Forecast Weather Database and Graphical Area Forecast Product (\$1.0M)* - NWS will build a database of critical aviation elements to support the generation of graphical products to transition from existing text-based terminal and en route forecasts. In addition, this digital format allows dissemination and display into FAA Decision Support Systems and into aircraft cockpits.
- *AutoNow Caster (\$0.3M)* – NWS, with NOAA Research, will develop and deploy a short-term (0 - 3 hour) interactive/automated thunderstorm forecast product. This will assist the FAA in improved daily decisions for routing aircraft throughout the U.S. National Airspace System (NAS).
- *New & improved Terminal Area Forecast (TAF) Preparation and Forecast Tools for Forecasters (\$0.4M)* - NWS will continue development and improvement of TAF monitoring system(s), improve TAF specific forecast model guidance, and develop a second-generation automated TAF forecast product. This will improve terminal-specific forecasts of winds, convection, weather and low ceiling and visibilities.
- *Volcanic Ash Collaboration Tool (VACT) (\$0.3M)* - Volcanic ash is an extremely hazardous condition to aviation. NWS and NOAA Research will implement VACT software at Volcanic Ash Advisory Centers (VAAC). This product will provide common situation awareness and real-time collaboration with other VAACs, customers, and partners for consistent advisories and forecasts for volcanic ash.
- *New Verification Capabilities (\$0.2M)* - NWS will partner with the FAA to develop new relevant metrics to determine weather effectiveness of the NAS.

### **New Aviation Training (\$0.3M)**

- *Forecaster Training (\$0.27M)* – NWS, in partnership with the FAA, will provide training to 120 NWS forecasters on operational impacts of forecast products and TAF preparation.
- *Pilot and Controllers Training (\$0.03M)* – NWS, in partnership with the FAA and Aviation Associations, will develop and implement new training products for pilots and controllers on the interpretation of weather products.

### **Benefits:**

These actions will provide additional operational capability to Aviation Services enabling the program to continue to drive performance improvements. Since the program started in FY 2003, we have attained significant improvement. For example, the False Alarm Rates of Low Ceiling and Visibility Forecasts at Airports improved 13% over the intended goal. As more comprehensive data sets are collected and inputted into forecast models, we anticipate that multiple NOAA programs and objectives will benefit. Specific areas of improvements for aviation will be improved forecast accuracy of moisture, convection, icing, low ceiling and visibility, all of which could increase by 10%.

Products and services currently in operations must be upgraded and adapted to function in digital environments to meet the evolving needs to support software decision support tools and more efficiently communicate dynamic weather information to gain operational efficiencies. All of these improvements will allow decision makers within the National Air Space System to better anticipate and exploit the weather to maximize efficiency and safety. Additionally, the congressionally mandated JPDO will have a profound effect on the next generation of the nation's airspace system and the program will support the National Plan to minimize the impact of weather and attain the goal of 95% on time arrival rate.

#### Performance Goals & Measurement Data:

This increase will support the objective: "Advance understanding and predict changes in the Earth's environment to meet America's economic, social, and environmental needs" under the DOC Strategic Goal of 'Observe, protect, and manage the Earth's resources to promote environmental needs.' Specifically, this increase supports NOAA's Commerce and Transportation strategic goal and the performance measures below.

Performance Goal: <i>Commerce &amp; Transportation</i>	FY06 Baseline	FY07*	FY08	FY11
<b>POD (Accuracy):</b>				
Thunderstorms <i>with</i> adjustment	26%	28%	33%	45%
Thunderstorms <i>without</i> adjustment	26%	28%	31%	35%
Icing <i>with</i> adjustment	68%	69%	72%	74%
Icing <i>without</i> adjustment	68%	69%	70%	72%
Turbulence <i>with</i> adjustment	54%	55%	58%	65%
Turbulence <i>without</i> adjustment	54%	55%	56%	60%
GPRA measure: Ceiling and Visibility <i>with</i> adjustment	47%	48%	51%	59%
Ceiling and Visibility <i>without</i> adjustment	47%	48%	49%	54%
<b>False Alarm Ratio (FAR)</b>				
GPRA measure: Ceiling and Visibility <i>with</i> adjustment	65%	64%	58%	50%
Ceiling and Visibility <i>without</i> adjustment	65%	64%	62%	55%

\* Lead time for implementation of developments and improvements is anticipated to be realized in following fiscal year.

**TERMINATIONS FOR 2007:** The following programs, and portions thereof, are terminated in FY 2007: Local Warnings and Forecasts Base (Hurricane Supplemental - \$8,870,000); Tsunami Warning and Environmental Obs (\$1,972,000); Hurricane Mitigation Alliance (\$2,071,000); Susquehanna River Basin Flood System (\$1,972,000); Vermont Northeast Weather & Wind Data Integration (\$217,000); Strengthen U.S. Tsunami Warning Network (\$128,000); Coastal & Inland Hurricane Monitoring & Prediction Program (\$1,480,000); Coastal Weather Monitoring for Catastrophic Events (\$468,000); Western Kentucky Environmental Monitoring Network (\$1,479,000), National Data Buoy Center (\$1,740,000); Shenandoah Air Quality Forecasting (\$1,726,000); Sea Level Monitoring & Tide Gage Network (\$237,000); WFO Maintenance (Hurricane Supplemental - \$990,000); and Weather Radio Transmitters (\$247,000).

**Subactivity: Operations and Research**  
**Line Item: Central Forecast Guidance**

**GOAL STATEMENT:**

See the Overview for the National Weather Service Operations, Research, and Facilities for a discussion of our goals.

**BASE DESCRIPTION:**

The modernized field office structure emphasizes warnings and short-range forecasts. The process by which these products are generated begins with centralized processing of weather observations, followed by the application of high-resolution computer simulations of the atmosphere on NOAA supercomputers, and adjustment by skilled National Centers for Environmental Prediction (NCEP) forecasters. The results are forwarded to local Weather Forecast Office (WFO) forecasters, who use them as the basis for local forecast products. Typically, local forecasters add the greatest value in the shortest forecast ranges. Beyond about three days, forecasts depend almost exclusively on NCEP output. The total forecast process depends critically on both NCEP products and local forecast efforts to enhance both accuracy and uniformity of service across the country.

In addition to their role in the local WFO forecast product generation, NCEP also provides the principal means through which NOAA provides operational weather, ocean, and climate prediction services for large areas, up to and including the entire globe, to a vast assortment of domestic and international users. These services typically exceed the domain of a single WFO, and require a large supercomputer. Efficiency demands that they be generated centrally.

The NCEP consists of seven science-based, service-oriented centers that generate environmental prediction products and two central activities supporting those services. The centers provide an integrated suite of forecast guidance and specific forecast products from the short-term through seasonal, interannual, decadal, and centennial time frames. Each service center depends on the observational infrastructure, the data assimilation systems, the numeric modeling function, and the application of model output statistics to produce value-added forecast guidance products for NWS field offices and direct users.

*Storm Prediction Center:* The Storm Prediction Center (SPC), located in Norman, Oklahoma, focuses on hazardous weather events such as severe thunderstorms and tornadoes, ice or heavy snow, fire weather and flash floods, with emphasis on the first few hours of the forecast period. Products issued from the SPC give the WFOs specific guidance as to the probability and intensity of severe weather occurrences for regional to local geographic scales.

*Hydrometeorological Prediction Center:* The Hydrometeorological Prediction Center (HPC), located in Camp Springs, Maryland, is responsible for preparing quantitative precipitation forecasts (QPF) that are used by WFOs to develop local rainfall, snow, and ice forecasts and by the Regional Forecast Centers (RFC) to develop local river and flood forecasts.

The HPC provides special QPFs and coordination to other federal agencies such as the Federal Emergency Management Agency (FEMA) during major flood events. The HPC also provides an array of analysis and forecasts of frontal systems, pressure patterns, temperature, and precipitation for use by WFOs and the private weather community.

*Ocean Prediction Center:* The Ocean Prediction Center (OPC), located in Camp Springs, Maryland, discharges U.S. international meteorological obligations to marine interests under the International Convention for Safety of Life at Sea, to which the U.S. is a signatory. It provides one-stop-shopping for marine interests operating outside the domain of coastal WFOs. The OPC provides weather and sea state warnings and forecasts for the high seas of the Northern Hemisphere for planning and operational purposes. Its warnings and products go directly to ships at sea, and are vital for the protection of life and property. The OPC also provides guidance forecasts for WFOs with coastal responsibilities, which extend out to about 100 nautical miles. Coastal WFOs have responsibility for local forecasts and warnings out to that limit; for the high seas beyond, the responsibility has been centralized in the HPC.

*Tropical Prediction Center/National Hurricane Center:* The NCEP experts in the area of tropical meteorology are concentrated at the Tropical Prediction Center (TPC)/National Hurricane Center (NHC) in Miami, Florida. Services provided by the TPC/NHC include advisories, watches, and warnings for tropical cyclones in the north Atlantic and eastern north Pacific oceans, the Caribbean Sea, and the Gulf of Mexico, including the portions of the U.S. coastline threatened by such storms. In addition, TPC forecasters provide aviation and marine analyses and forecast products for the same areas of responsibility. The TPC/NHC functions both to provide guidance, coordination, and tropical weather expertise to WFO forecasters and to serve users of centrally generated products.

*Aviation Weather Center:* The Aviation Weather Center (AWC), located in Kansas City, Missouri, is the mechanism by which the U.S. discharges its weather forecasting obligations to the aviation community under an international agreement through the International Civil Aviation Organization. The AWC provides wind, temperature, and flight hazard (e.g., icing, and turbulence) forecasts for flight planning and en route aircraft operations for the U.S., the north Atlantic and north Pacific routes, and some routes in the southern hemisphere. In addition to the en route weather support provided for the aviation industry, the AWC also produces guidance products for use by WFOs in support of the airport terminal forecast function. Thus, the AWC discharges large-scale, global aviation functions which can be sensibly centralized, while the WFOs discharge local aviation functions based on centralized guidance provided by the AWC.

*Climate Prediction Center:* The Climate Prediction Center (CPC), located in Camp Springs, Maryland, produces climate services consisting of operational prediction of climate variability; monitoring of the climate system and development of databases for determining current climate anomalies and trends; and analysis and assessment of their origins and linkages to the rest of the climate system. These services cover climate time scales ranging from weeks to seasons, extending into the future as far as technically feasible, and cover the domain of land, ocean and atmosphere, extending into the stratosphere. WFOs, as well as the public, private industry, and the international research community use CPC climate services.

*Space Environment Center:* The Space Environment Center (SEC), located in Boulder, Colorado, provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances.



SEC provides services to a broad user community of government agencies, industries, public institutions, and private individuals involved in satellite operation, space exploration, radio navigation, high-altitude polar flights, high-frequency communications, remote intelligence gathering, long-line power and data transmissions, and geophysical exploration. SEC serves many government, industry and private-sector clients, and such end-product users as the power industry and the National Aeronautics and Space Administration (NASA). SEC's research scientists study the sun's electromagnetic, particle, and magnetic-field emissions and the processes by which they affect the near-earth space environment. SEC takes a leading role in advocating and designing new space-environment sensors for operational use. The SEC, with the U.S. Air Force, operates the national civilian space weather service. Forecasts, alerts, and warnings are provided to customers on a 24 hour-per-day, seven day a week basis. SEC products are synthesized from over 1,400 data streams providing observations of the solar terrestrial environment, including x-ray flux, charged particles, and magnetic field changes produced by solar disturbances.

NCEP also maintains two critical support organizations to facilitate the central forecast guidance process:

*NCEP Central Operations:* The Central Operations (NCO) of NCEP operates the NOAA Central Computing Facility, manages the computer production suite upon which all NCEP services are based and the communications linking the several parts of NCEP, and provides operational quality assurance of incoming observations and outgoing products. NCO staff also provides central support for software development for data processing, display, interaction, and product generation. The NCO is the technical transition point between the development of numerical weather and climate prediction models and their operational use by forecasters at the NCEP and WFOs. The NCO staff also provides central support for software development for data processing, display, interaction, and product generation. The NCO consists of computing, communications, and software specialists, as well as meteorologists with special knowledge of numerical modeling operations.

*Environmental Modeling Center:* NCEP's Environmental Modeling Center (EMC) develops, enhances, and maintains complex data assimilation and numerical model systems that span the globe. The computer models and other numerical forecast products developed by the EMC provide the basic guidance that meteorologists at the NCEP and WFOs use in making weather and climate predictions. EMC serves as the integrator of numerical modeling research and development performed in universities and research laboratories. Model impact studies are conducted by the EMC to validate data sets that lead to new data requirements from observing technologies (satellites, radar, etc.).

Base activities support the objective, "Advance understanding and predict changes in the Earth's environment to meet America's economic, social, and environmental needs" under the Department of Commerce strategic goal of "Observe, protect, and manage the Earth's resources to promote environmental needs."

**PROPOSED LEGISLATION:**

None.

### SUMMARIZED FINANCIAL DATA

(Dollars in thousands)

Subactivity: Operations and Research	FY 2005 ACTUALS	FY 2006 CURRENTLY AVAILABLE	FY 2007 BASE PROGRAM	FY 2007 ESTIMATE	INCREASE / DECREASE
Line Item: Central Forecast Guidance					
Central Forecast Guidance (C )	5,725	5,864	6,178	6,178	-
Central Forecast Guidance (CT)	2,807	2,876	500	500	-
Central Forecast Guidance (WW)	37,581	36,743	44,385	44,385	-
National Hurricane Center	-	5,721	-	-	-
TOTAL	46,113	51,204	51,063	51,063	-
FTE	284	299	299	299	-

Note: The dollars in this table represent budget authority.

#### PROGRAM CHANGES FOR FY 2007:

None

**TERMINATIONS FOR FY 2007:** The following programs, and portions thereof, are terminated in FY 2007: Central Forecast Guidance W&W (Hurricane Supplemental - \$2,000,000)